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If W be the weight of the bar, and b the length between the nth and the $n + 1$th support, a the whole length of the bar, and m the whole number of supports (placed at equal distances), he proves that the extension of surface of that portion of the bar lying between the nth and $n + 1$th support will be represented by

$$\frac{W\,b}{6\,a}\left\{3 \,.\, n \,.\, \overline{n - 1} \,.\, b^2 + b^2 + 6 \,.\, \overline{n - \tfrac{1}{2}} \,.\, b\,c + 3\,c^2\right\}$$

$$- \frac{b^2\,W}{2\,m} \,.\, n \,.\, \overline{n - 1} - \frac{b^2\,W}{2\,m} \,.\, n.$$

The sum of all the extensions is then taken from $n = 1$ to $n = m$, which gives the whole extension between the 1st and the mth, or last support.

If, also, c be the length of bar projecting beyond each of the terminal supports, and e the distance from each end of the bar at which the defining points are marked, then the additional extensions at both ends of the bar of the length $c - e$, will, by integration, be found to be represented by $\frac{c^3 - e^3}{6\,a}$ W. Adding this to the former expression, and remembering that

$$c = \frac{a}{2} - \overline{m - 1} \,.\, \frac{b}{2},$$

the expression for the whole extension of the bar between the defining points reduces itself to the very simple form

$$\frac{W}{24\,a}\left\{a^3 - 8\,e^3 - (m^2 - 1)\;a\;b^2.\right\}$$

And if this be made $= 0$

$$b = \frac{a}{\sqrt{m^2 - 1}}\sqrt{1 - \frac{8\,e^3}{a^3}}.$$

II. An Account of some Ancient Astronomical Tables in the Library of the Reverend Charles Turnor, A.M., F.R.S., &c. By Mr. Richard Harris, Assistant-Secretary of the Society.

One of the volumes containing these tables is without date or title, but from its containing a calendar for the year 1349, there can be little doubt of that portion, at least, having been written in the early part of the fourteenth century. The other volume contains a calendar for the year 1347, and bears the title *Tabulæ Mediorum Motuum omnium Planetarum.* From an inscription on the fly-leaf it appears that it once belonged to the fraternity of Tolerants, or Grey Friars, at Babewell, near Bury St. Edmund's. The tables, which form the principal portion of the volume, were computed for the meridian of Oxford, and bear the general title "Almanak editum Oxoniæ:" they appear to have been chiefly formed from the famous Alphonsine Tables; the requisite correction being applied throughout for the difference of meridians, and some trifling alterations made in the method of arrangement to suit the

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convenience of computers. In addition to solar, lunar, and planetary tables, this part of the volume contains a list of remarkable places, with their latitudes and longitudes.

Motives of convenience appear to have induced the writer or possessor of the *Oxford Almanac* to bind with it a calendar and astronomical ephemeris, in which the places of the sun, moon, and five planets, are given in regular order for every day of the year, together with the correction for their motions in hours, minutes, seconds, &c., besides the usual lists of saints' days, and other matters relative to the Church. This ephemeris was computed for 1347, but was intended for permanent use, tables being added which contain the necessary corrections for determining the places of the heavenly bodies on the corresponding days for several years.

This calendar is followed by tables of the retrogression of the five planets by Johannes de Lineriis, a writer of whom little is known, though he has been characterised by an old biographer as one of the four most celebrated astronomers that flourished between the times of Alphonso and Purbach.

The greater part of the other volume is occupied with a transcript of the Toledo Tables, usually attributed to Arzachel: among these are tables of the places of the sun, moon, and planets, and of the agreement of the Christian with the Arabic, Persian, and other eras. There is also a table of trepidation or libration, computed on the assumption that the point of intersection of the ecliptic and equinoctial moves in a small circle described with a radius of 4° 18′ 43″; the limits of the libration in longitude being 10° 45′ east and west from the mean place, and its period about 4182 lunar years.

This part of the volume also contains a geographical table, tables of sines, of shadows or co-tangents, and of declinations, computed for an obliquity of 23° 33′ 30″. A catalogue of thirty-five fixed stars is likewise given, which is curious and interesting from the circumstance of its being apparently derived from a copy of Ptolemy's great catalogue, which has either perished or escaped the notice of commentators.

This collection of tables is followed by a calendar for the year 1349, tables of planetary motions, lunar tables *cum canonibus*, and a few examples of the method of computing the places of the heavenly bodies from the data furnished in the earlier parts of the same volume.

In the recently published *Cycle of Celestial Objects*, Captain Smyth gives a short account of these MSS., and the high value he attached to them led the author of this paper to make a full examination of the tables, and the theories on which they are founded, the details of which were read to the meeting.

The following communication was not received in time to be read at the meeting, but it is thought desirable that the publication of it should not be delayed:—

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